FRACTIONALLY INTEGRATED ARMA PROCESSES WITH CONTINUOUS TIME PARAMETER

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Abstract

A class of zero-mean fractionally integrated Lévy-driven CARMA processes is defined by convoluting the continuous-time ARMA kernel with a kernel corresponding to Riemann-Liouville fractional integration, and explicit expressions are derived for the kernel and autocovariance functions of these processes. They are long-memory in the sense that their kernel and autocovariance functions decay asymptotically at hyperbolic rates, depending on the order of fractional integration. Comparisons are made with discrete-time fractionally integrated ARMQA processes. In order to introduce long-memory into *non-negative* Lévy-driven CARMA processes, which can be used as long-memory models for volatility, we replace the fractional integration kernel with a closely related absolutely integrable kernel. This gives a class of stationary non-negative continuous-time Lévy-driven processes whose autocovariance functions at lag h also converge to zero at asymptotically hyperbolic rates.

KEYWORDS: *continuous-time ARMA process, Lévy process, stochastic volatility, long memory, fractional integration.*